HPLC Analysis of Active Ingredient Content of Cannabidiol (CBD) Products Commonly Used by UT Tyler Students

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Background

Legalization of hemp products in Texas has resulted in an increase of cannabidiol (CBD) products accessible to the public. Hemp differs from marijuana in that it must contain less than 0.3% of tetrahydrocannabinol (THC) while marijuana is composed of predominantly THC. CBD products come in many formulations such as creams, oils, drinks, etc. CBD products are not manufactured under FDA standards leading to questionable variability in the content of these products.

Objective

The purpose of this study was to develop a method using HPLC to quantify and identify cannabinoids within commonly used CBD products amongst UT Tyler students. Additionally, the study aims to determine the CBD content recovered in a condition that simulates gastric and intestinal physiological fluids.

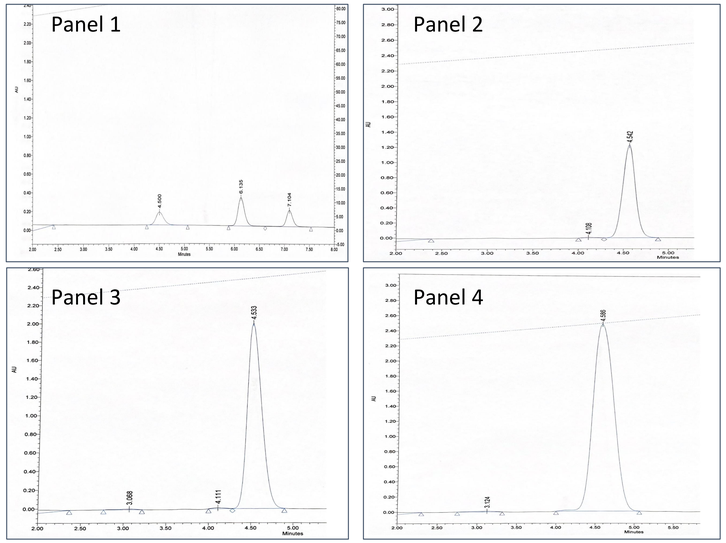
Methods

Figure 1: High Performance Liquid Chromatography (HPLC) is used to separate compounds to identify and quantify their individual components.

Various concentrations of the dilutions were created and injected in the HPLC at different volumes to determine which condition would produce the most accurate peak.

Methods (Continued)

CBD dilutions were prepared in Methanol: Isopropanol (1:1), Simulated Gastric Fluid (SGF), and Simulated Intestinal Fluid (SIF). The dilutions consisting of Gastric fluid and Intestinal fluid were prepared in conditions that mimic physiological processes.



Panel 1 shows a standard cannabinoid solution of CBD, CBN, and THC at 5% injected at 10 µL. Panels 2-4 show 5% CBD (DF01) in Methanol: Isopropanol injected at 5 µL (Panel 2), 10 µL (Panel 3) and 20 µL (Panel 4).

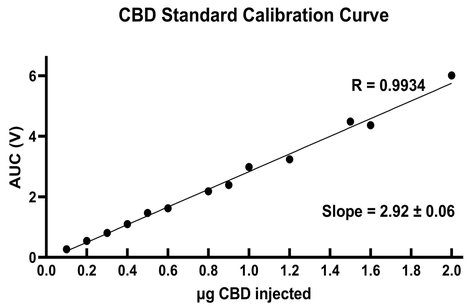
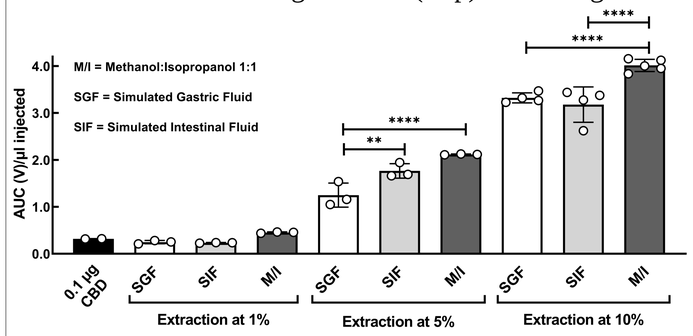


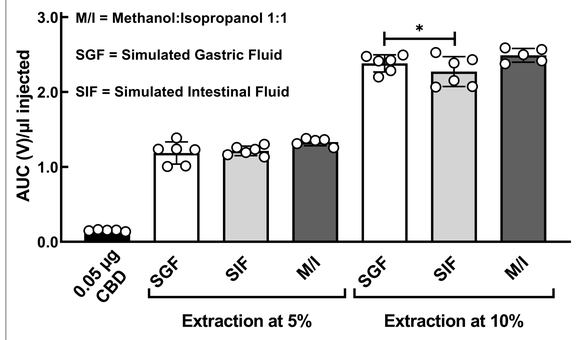
Figure 3: Concentration curve of standard cannabinoid solution

A series of concentrations of standard cannabinoid solution were prepared (0.1%-5%), injected (10µL-40µL) and plotted to determine the range of absorbance detectable using the HPLC (Figure 3).

Results

Extraction of CBD Dosage Form 1 (Top) and Dosage Form 2 (Bottom)





* = p=0.05

** = p=0.01

*** = p=0.001

**** = p=0.0001

Using the described method, we calculated that ~70% of CBD was retrieved in the methanolic, as compared to the labeled amount, in both DF01 and DF02. However, when comparing the absorbance between the physiological conditions, <70% of DF01 was recovered while there was >70% absorbed in each condition in DF02.

Conclusion

The method created allowed for accurate analysis of cannabinoids from CBD oil. The results from this method allowed for quantification of absorption among products. Upon quantification, discrepancies between the quantity absorbed and quantity labeled were identified.

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